Immersive Video as a Rapid Prototyping and Evaluation Tool for Mobile and Ambient Applications

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ABSTRACT

A key issue in mobile and ambient computing is the effort required to rapidly prototype and evaluate user interfaces and applications. Existing technologies for these tasks suffer either from low fidelity (e. g. paper prototypes, mental walkthroughs) or effectively require a near full-scale deployment. We propose an approach using immersive video with surround sound and a simulated infrastructure to create a very realistic environment in the office or the lab. It provides a low-cost and rapid means to prototype user interfaces and applications, and to evaluate them in a realistic simulation of the context, in which they are intended to be used.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: User-Centered Design

General Terms

Human Factors, Experimentation

Keywords

Immersive video, rapid prototyping, evaluation, mobile and ambient user interfaces.

1. BACKGROUND AND MOTIVATION

Rapid prototyping and early evaluation are key elements of a user centred approach to the design and implementation of mobile systems. There is a large body of methods designed for desktop applications such as paper prototypes or cognitive walkthroughs, which are well suited for stationary/desktop settings but they have some severe shortcomings when applied to mobile or ubiquitous settings [1]. The key problem relates to the defining property of mobile and ubiquitous systems: they are used in different locations and situations and thus are heavily influenced by *contextual factors*. However, these contextual factors (such as the crowdedness of a place, visual and aural impressions or affordances of a location) are hard to convey using standard approaches.

2. IMMERSIVE VIDEO

To overcome the shortcomings that emerge when applying traditional prototyping and early evaluation approaches to mobile systems, we propose the use of *immersive video* to capture the sensory experiences that we expect users to be exposed to at deployment locations. By capturing video (imagery and sound) at the site of the intended deployment of a location-based service and simulating the sensor infrastructure, system developers can have ready access (i.e. in the development office) to a high fidelity recreation of a user's experience of using a prototype mobile system on location. Figure 1 shows the prototypical system we have developed in use in our CAVE. It has the following key features:

Figure 1: A user interacting with a mobile device while being surrounded by an immersive video replay of the location, where it is intended to be used

- It simulates sensory experience by replaying a wide field-of-view of a scene (typically between 140-360°) with surround sound.
- It incorporates a state-based environment model, which allows for seamless transitions between different locations and/or situations.
- It simulates the technology infrastructure envisioned for or provided at the target locations (e. g. GPS).

3. REFERENCES

[1] S. Long, R. Kooper, G. D. Abowd, and C. G. Atkeson. Rapid prototyping of mobile context-aware applications: The Cyberguide case study. In *Mobile Computing and Networking*, pages 97–107, 1996.

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